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LACIE-C00200
VOLUME IC (REV. A)
JSC-09875

7.9-10110
Tm-79974

LARGE AREA CROP INVENTORY EXPERIMENT (LACIE)

N79-18379

(E79-10110) LARGE AREA CROP INVENTORY
EXPERIMENT (LACIE). LEVEL 3 BASELINE; DATA
ACQUISITION, PREPROCESSING AND TRANSMISSION
SUBSYSTEM (DAPTS), HISTORICAL AGRICULTURAL
DATA REQUIREMENTS, VOLUME 1C, REVISION A

HC R04/MF R01
Unclass
G3/43 00110

sponsorship
no wide dis-
resource Survey
made thereof.



NASA NOAA USDA

Level 3 Baseline

DATA ACQUISITION, PREPROCESSING AND TRANSMISSION SUBSYSTEM (DAPTS) - HISTORICAL AGRICULTURAL DATA REQUIREMENTS

NOTICE: THIS IS A BASELINED LEVEL 3 DOCUMENT CON-
TROLLED BY THE LACIE LEVEL 3 CHANGE CONTROL BOARD.
ANY PROPOSED CHANGES SHOULD BE DOCUMENTED ON AN
RECP FORM AND TRANSMITTED TO R. B. MACDONALD,
LACIE MANAGER, NASA-JSC, CODE TF, HOUSTON, TEXAS 77058.

National Aeronautics and Space Administration
LYNDON B. JOHNSON SPACE CENTER

Houston, Texas

December, 1975

REVISIONS

REV LTR	CHANGE NO.	DESCRIPTION	DATE
		BASELINE ISSUE (Reference CCBD #III-0001, dated December 16, 1974)*	12-16-74
A	5M0047	Major revision due to recode effort (LACIE Change Notices 5M0021 & 5M0035 are incorporated in this revision)	12-16-75
		*The changes required by the following RID's which were approved during the LACIE Project Review conducted December 3 through 5, 1974, have been incorporated into this baseline issue of the LACIE Level III Requirements Documents: 0-2 through 0-13, 0-15 through 0-29, and 0-31 through 0-46 1a-1, 1a-2, 1a-10, 1a-21, 1a-34, and 1a-36 1b-3 and 1b-6 1c-2, 1c-4, 1c-5, 1c-9, 1c-10, 1c-13, 1c-16, 1c-17, and 1c-20 2-12a, 2-13, 2-17, and 2-27 All other changes required by the remaining RID's approved during the Project Review will be incorporated by transmitting an RECP to the LACIE Level III Change Control Board for approval. Each RECP should be accompanied by the appropriate RID Closeout Form as described during the Project Review.	

LACIE-C00200, VOLUME IC
(REVISION A)

LIST OF EFFECTIVE PAGES

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<u>vi</u>	2/13/76	6M0001 6M0002 6M0004
<u>vii</u> through <u>viii</u>	Baseline 12/16/75	5M0047
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<u>x</u> through <u>xi</u>	Baseline 12/16/75	5M0047
<u>1-1</u> through <u>6-8</u>	Baseline 12/16/75	5M0047
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<u>7-1</u> through <u>F-1</u>	Baseline 12/16/75	5M0047
<u>F-2</u> and <u>F-3</u>	4/12/76	6M0011
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<u>F-6</u>	5/7/76	6M0019
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FOREWORD

Efficient management of the Large Area Crop Inventory Experiment (LACIE) dictates that effective controls of project activities be established. To provide a basis for effective control, documentation will be prepared, baselines will be established, and changes to the baseline will be subsequently controlled by the proper management levels.

The specific control documents which will be used are defined in the LACIE Project Plan, LACIE-C00605. All elements of the LACIE Project must adhere to these baselined control documents, and, where it is considered that the requirements should be changed, the proper change request, accompanied by a full justification, must be submitted to the proper management level in accordance with established procedures. These documents will be maintained current by change notices and revisions will reference the applicable Change Control Board Directive (CCBD) which approved the change.

This document, LACIE-C00200, Volume IC, Revision A, defines the LACIE Data Acquisition, Preprocessing, and Transmission Subsystem (DAPTS) historical agricultural data requirements, and has been prepared in accordance with the "Instructions for Preparation of LACIE Requirements Documents," LACIE-00100, Revision C, dated November 20, 1974. "Full-Up System," as used in this document is defined as the system required to fulfill the requirements of LACIE Phase II. In general, the approach used in each section is first to specify the requirements of the Full-Up System and then to specify the requirements of any interim system by reference to specific paragraphs, in the Full-Up System requirements sections of the document. The LACIE Project Phases are defined in the LACIE Project Plan, LACIE-C00605.

The organization responsible for the implementation of each requirement defined in this document is specified on an individual requirement basis. Where the implementation responsibility applies to the complete section, the implementation responsibility is specified after the section title. A "section" for the purposes of designating implementation responsibility is defined as being any numbered paragraph and all subparagraphs. Where different implementation responsibilities apply to different portions of a section, the implementation responsibility is specified on an individual paragraph or sentence basis, as applicable. All implementing

organizations designated shall accomplish their implementation activities in accordance with the requirements specified herein.



R. B. MacDonald

Manager, Large Area Crop Inventory Experiment

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GLOSSARY

ASCS	Agricultural Stabilization and Conservation Service
CAMS	Classification and Mensuration Subsystem
CAS	Crop Assessment Subsystem
CCB	Change Control Board
CCBD	Change Control Board Directive
DAPTS	Data Acquisition, Preprocessing and Transmission Subsystem
FAS	Foreign Agricultural Service
FSO	Facilities Support Office
Full-Up	The system required to accomplish LACIE Phase II
GSFC	Goddard Spaceflight Center
ICD	Interface Control Document
IE	Information Evaluation
Interim Systems	System requirements to accomplish subphases of LACIE Phase I, excluding subphases IA and IB
ISRRS	Integrated Storage, Retrieval and Reformatting Subsystems
ITS	Intensive Test Site
JSC	Lyndon B. Johnson Space Center
LACIE	Large Area Crop Inventory Experiment
Landsat	Land Satellite (formerly ERTS)
LEC	Lockheed Electronics Company, Inc.
LPDL	LACIE Physical Data Library
NASA	National Aeronautics and Space Administration

NOAA National Oceanic and Atmospheric
Administration

ONC Operational Navigation Chart

QA Quality Assurance

RAS Regional Analysis Section

RT&EB Research, Test and Evaluation Branch

SPE System Performance Evaluation

SRS Statistical Reporting Service

TBD To be determined

T&E Test and Evaluation

USAF United States Air Force

USDA United States Department of Agriculture

YES Yield Estimate Subsystem

SECTION 1.0
FUNCTIONAL RESPONSIBILITIES

1.1

GENERAL

The Data Acquisition, Preprocessing and Transmission Subsystem (DAPTS) is responsible for the acquisition, standard preprocessing, and transmission of all historical field and real-time meteorological data required for the LACIE project. This document describes the requirements for historical agricultural data.

1.2

SPECIFIC

The specific responsibilities of DAPTS for historical agricultural data include assimilating requirements for acquiring, preprocessing, and performing preliminary analysis to develop ancillary data packets and crop calendars, maintenance of comprehensive data files for each LACIE country, and transmitting the data to the Information Storage, Retrieval, and Reformatting Subsystem (ISRBS).

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SECTION 2.0
APPLICABLE DOCUMENTS

The following documents are applicable to the extent specified herein:

- A. LACIE-00100, Instructions for Preparation of LACIE Subsystem Requirements Document, Revision C, November 20, 1974.
- B. LACIE - Project Plan, LACIE-C00605, November 18, 1974.
- C. USDA/NASA/JSC Interface Control Document, dated November 1975.

SECTION 3.0
FUNCTIONAL FLOW DIAGRAMS

- 3.1 DAPTS HISTORICAL AGRICULTURAL SUBSYSTEM
DEVELOPMENT
 - 3.1.1 Full-Up System
The functional flow diagram for the development of the portion of DAPTS data related to historical agricultural data is presented in figure 3-1.
 - 3.1.2 Interim Systems
Not applicable.
- 3.2 DAPTS HISTORICAL AGRICULTURAL SUBSYSTEM
OPERATION
 - 3.2.1 Full-Up System
The functional flow diagram for the operation of the portion of DAPTS related to historical agricultural data is presented in figure 3-2. The subsystem interfaces are depicted in figure 3-3.
 - 3.2.2 Interim Systems
Not applicable.

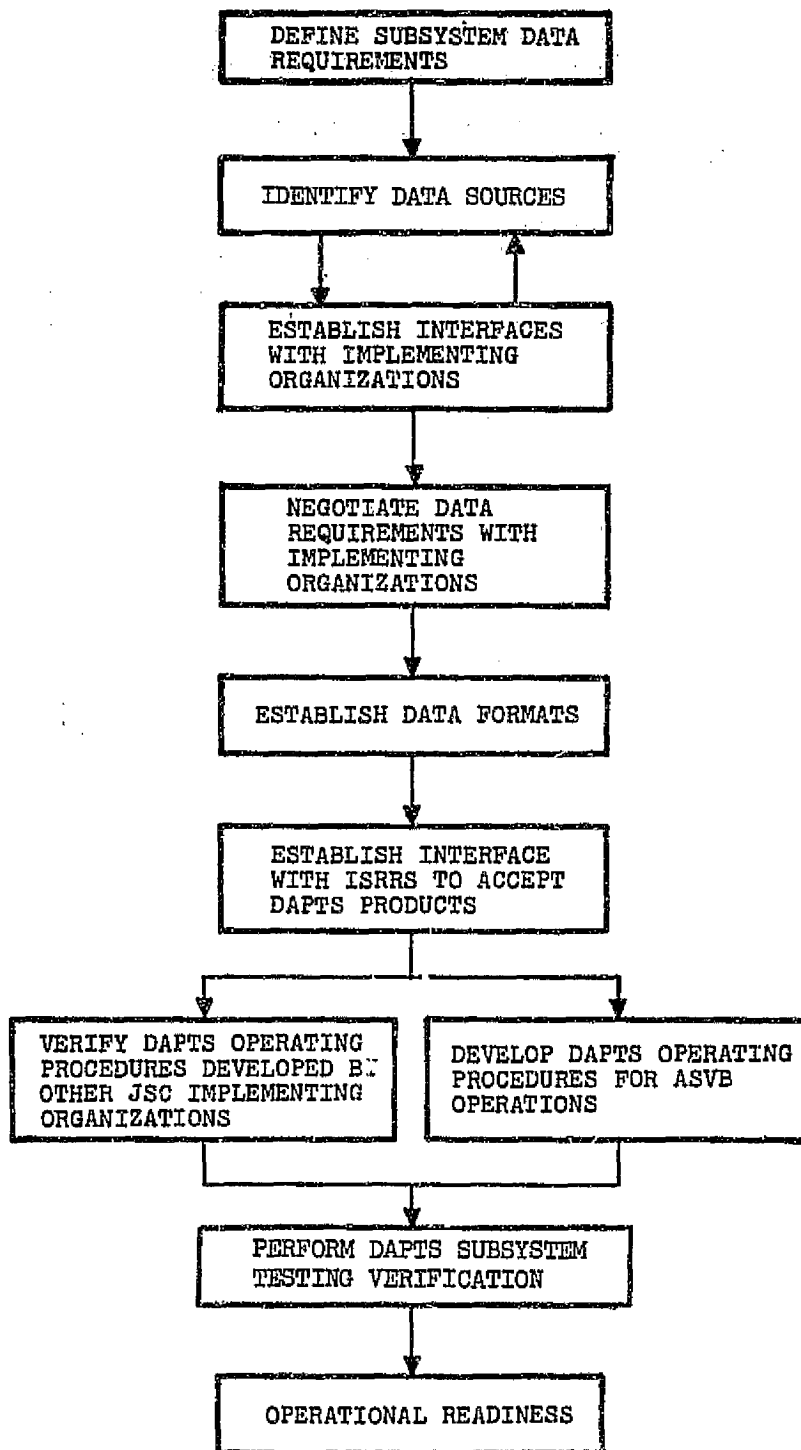


Figure 3-1.- Flow diagram of simplified DAPTS subsystem development.

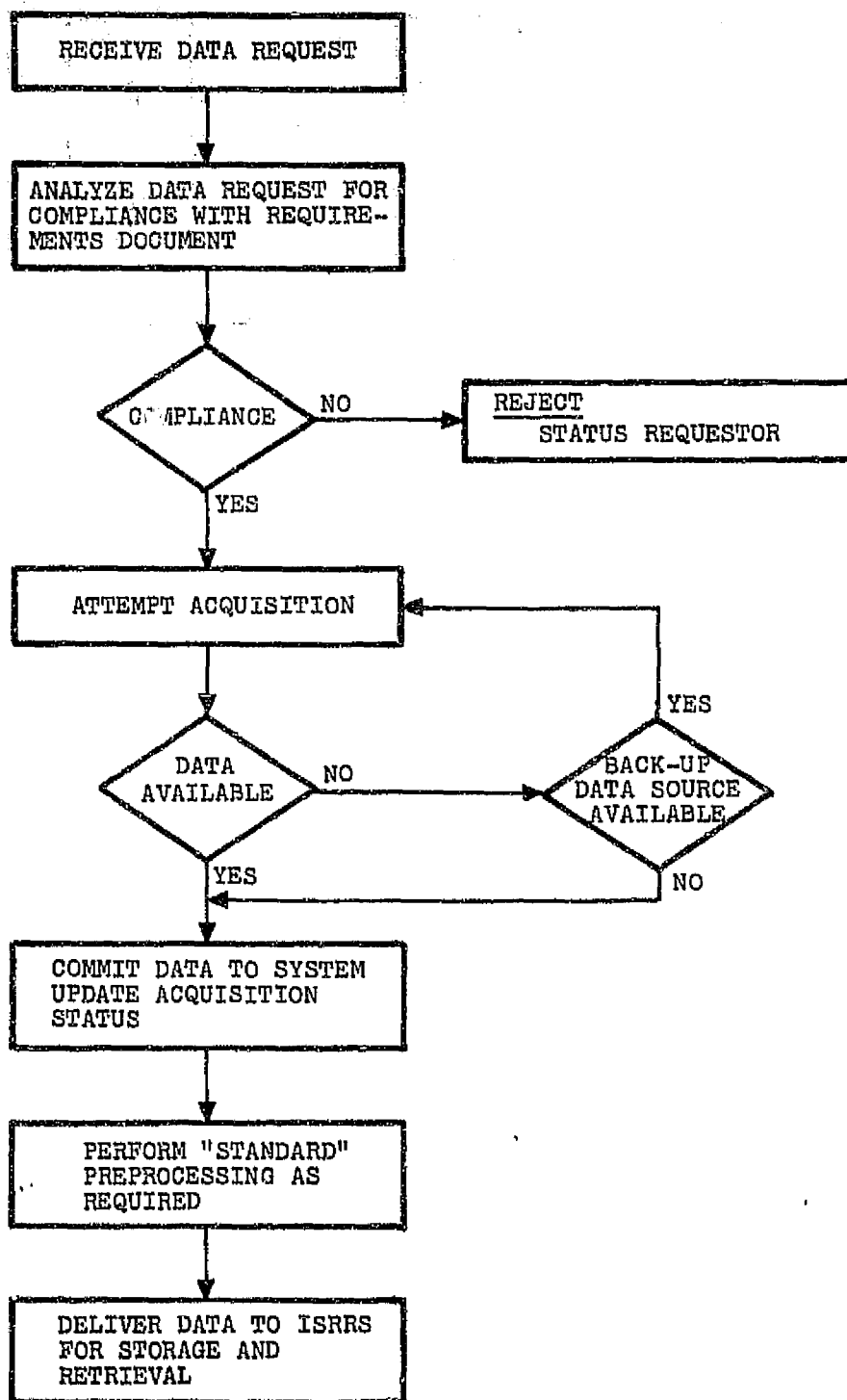


Figure 3-2.- Simplified DAPTS operations flow diagram.

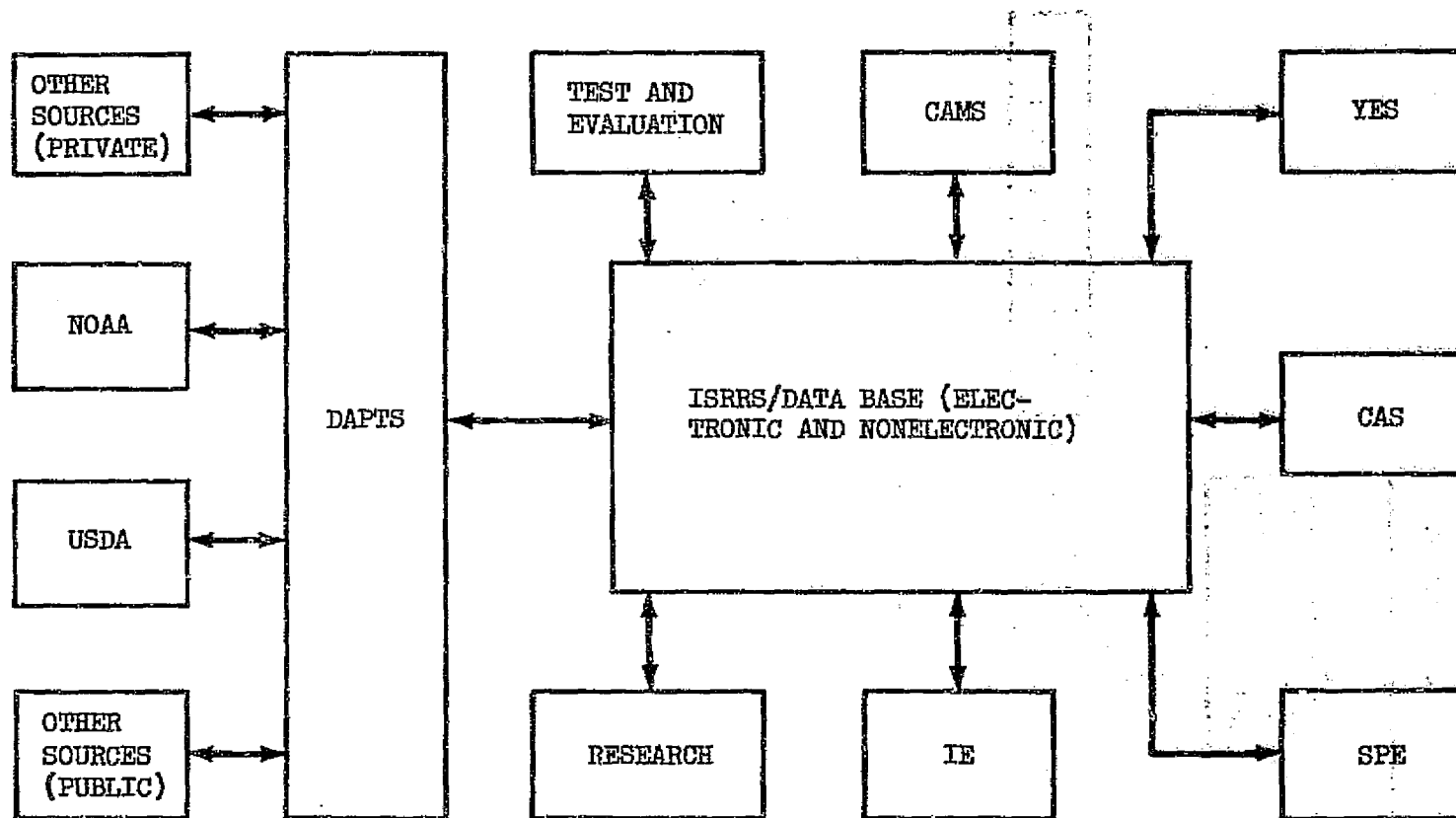


Figure 3-3.- Subsystem interfaces - DAPTS.

SECTION 4.0
CONSOLIDATED REQUIREMENTS

4.1 FULL-UP SYSTEM

4.1.1 Introduction

Acquisition of historical agricultural data to support LACIE requirements will involve close liaison with government agencies which can supply the data, as well as in-house capability for analyzing the data received.

4.1.2 Participating Organizations

4.1.2.1 NASA-Johnson Space Center Science and Applications Directorate, Earth Observations Division.

4.1.2.1.1 Applications System Verification Branch: In the Applications System Verification Branch (ASVB), the DAPTS has the overall responsibility for collecting all historical agricultural data to support LACIE. This includes requirements definition, procedures preparation, data gathering and analysis and report preparation, review, and transmittal to the ISRRS.

4.1.2.1.2 Regional Analysis Section: The Lockheed Electronics Company, Inc. (LEC) Regional Analysis Section (RAS) provides support to DAPTS by assisting in defining the data requirements of the various subsystems and by performing analyses of raw historical data to produce specialized output data products.

4.1.2.1.3 Facilities Support Office: The Facilities Support Office (FSO) (TF12) supports DAPTS in the following areas:

- A. By providing cartographic and drafting support for preparation of maps and illustrations used in reports prepared by the RAS.
- B. By acquiring maps and documents identified by DAPTS as required to support LACIE historical agricultural data requests.
- C. By cataloging, distributing, and storing maps and documents used in the LACIE

nonelectronic historical agricultural data base.

4.1.2.2 United States Department of Agriculture.- The United States Department of Agriculture (USDA) is the primary source for all historical agricultural data required by the LACIE. Initially, the USDA will be responsible for providing basic historical data from its data base to the LEC RAS for evaluation and analysis. As requirements become better defined, the USDA will be requested to provide data products directly satisfying LACIE requirements. At that time the RAS will perform specialized, quick turnaround analyses, in addition to acting as liaison with USDA for the standard data products.

4.1.3 Data Acquisition

4.1.3.1 Crop calendars.- Raw crop calendar data for areas containing the 4800 segments will be acquired from the USDA, using a standardized format and definitions of stages of development (Required by CAMS, YES and CAS; Category 2; Implementation Responsibility: DAPTS/USDA).

A crop calendar will be generated for each sample segment. If more than one segment occurs in an area of uniform growing conditions, the same crop calendar may be used. The RAS will perform the analyses necessary to group segments under one crop calendar. Completed crop calendars will be delivered to the nonelectronic ISRRS for storage.

4.1.3.2 Cropping practices.- Cropping practices data for areas containing the 4800 segments shall be collected from the USDA and other sources by the RAS (Required by CAS, CAMS & YES; Category 2; Implementation Responsibility: DAPTS/USDA).

A cropping practices report for each segment will be prepared by the RAS; however, the same report may apply to more than one segment, depending on the level of detail available. Completed reports will be delivered to the nonelectronic ISRRS for storage.

4.1.3.3

Historic agricultural statistics.- Historic agricultural statistics are required for the ITS and the 4800 sample segments over the last 15 years if available (Required by CAMS, YES and CAS; Category 2; Implementation Responsibility: DAPTS/USDA).

The data to be acquired from USDA are:

- A. Wheat acreage (planted and harvested) to the smallest political subdivision.
- B. Confusion crop acreage to the smallest political subdivision.
- C. Wheat yield and production to the smallest political subdivision.
- D. Total agricultural acreage.
- E. Maps identifying political subdivision boundaries.

A report will be prepared containing statistical data on all political subdivisions containing one or more sample segments or ITS's.

4.2

INTERIM SYSTEMS

The only LACIE functional element that has levied Phase I requirements on DAPTS is YES. During Phase I, YES will require mean crop calendars for wheat, TBD small grains and other TBD dominant crops for all areas considered in the Phase I effort. (Required by YES; Cat. 2; Impl. resp.: DAPTS/USDA).

SECTION 5.0
SUBSYSTEM INPUT REQUIREMENTS

Inputs required by the DAPTS from the other LACIE functional elements are defined in the following subparagraphs.

- 5.1 FULL-UP SYSTEM
 - 5.1.1 DAPTS
Not applicable.
 - 5.1.2 CAMS
Not applicable.
 - 5.1.3 YES
Not applicable.
 - 5.1.4 CAS
TBD
 - 5.1.5 ISRRS
Not applicable.
 - 5.1.6 SPE-FA
Not applicable.
 - 5.1.7 IE
Not applicable.
 - 5.1.8 Research
Not applicable.
 - 5.1.9 Test and Evaluation
Not applicable.
- 5.2 INTERIM SYSTEMS
Not applicable.

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SECTION 6.0
OUTPUT REQUIREMENTS

Outputs from DAPTS which will be provided to the other LACIE functional elements are defined in the following subparagraphs.

6.1 FULL-UP SYSTEM

6.1.1 Data Acquisition, Preprocessing and Transmission Subsystem
Not applicable.

6.1.2 Classification and Mensuration Subsystem
The following are descriptions of the required historic agricultural data in support of the CAMS.

6.1.2.1 Soil maps.- (Required by CAMS; Category 1; Implementation Responsibility: DAPTS/USDA). Four copies of individual soil maps for the U.S. and each LACIE foreign country are required. The areas within each country for which soils information is required are those areas used for sample segment definition. Maps are to be provided as a positive print, at a scale of 1:5,000,000 or greater (as available), and at a known projection. The soil classification system preferred is the 7th approximation system, however the genetic (Dokuchev) system is also acceptable. In both classification systems there must be a sufficient level of detail on the maps provided to allow determination of the boundaries of soil suborders. Maps must be reviewed yearly and updated as new material becomes available prior to each LACIE phase.

6.1.2.2 Topographic Maps.- (Required by CAMS; Category 1; Implementation Responsibility DAPTS/FSO). One copy of topographic maps for all areas containing sample segments are required for all LACIE countries. In the U.S. these maps are required in scales of 1:24,000 and 1:250,000 for each sample segment and 1:1,000,000 for areas containing one or more sample segments. Substitute maps of 1:62,500 scale are acceptable where 1:24,000 scale maps are not

available. The contour interval shall be the standard for the scale map under consideration with the criterion being to show the greatest amount of detail while maintaining clarity.

For the LACIE foreign countries the maps required will be at, or as near as possible to, the scale and detail of the U.S. maps. In cases where topographic maps are not available, relief maps showing feature changes using hachures, tints, or shading will be provided.

These maps (both U.S. and foreign) will be updated as better information becomes available.

6.1.2.3

A priori probabilities.- (Required by CAMS; Category 3; Implementation Responsibility: DAPTS/USDA). DAPTS has the responsibility of providing raw input data for the operation of a computer program to compute the a priori probability of wheat in a given unit area. The input parameters are TBD.

A computer program specification, detailing the computational procedures to be employed, the frequency of computations, input data sources, output formats and any other required pertinent data and information required to develop the probabilities and their associated errors will be supplied to DAPTS and CAMS. This program will be implemented and operated by DSAD (Required by CAMS; Category 3; Implementation Responsibility: DAPTS/DSAD).

The various categories of agricultural ground cover to be considered are listed in the following subparagraph.

6.1.2.3.1

A priori probabilities: There is a requirement to determine that, if a segment of land is cropland, the cover class is a member of one or more of the following categories:

- A. Winter wheat
- B. Spring wheat
- C. Wheat
- D. Winter cereal
- E. Spring cereal

- F. Cereal
- G. Fall plowed crop
- H. Spring plowed crop
- I. Harvested winter wheat
- J. Harvested spring wheat
- K. Harvested spring cereal
- L. Harvested winter cereal
- M. Harvested fall plowed crop
- N. Harvested spring plowed crop

The estimated error in each of the above probabilities is required. These values are to be stored in the electronic ISRRS and are to be available to the CAMS whenever the CAMS is operating. An interactive query capability shall also be provided.

6.1.2.4

Ancillary summaries. - (Required by CAMS; Category 1; Implementation Responsibility: DAPTS/USDA). DAPTS shall output to the LPDL for the CAMS one copy of an ancillary data summary for each of the 4800 sample segments. The summaries shall contain information on soils, climate and cropping practices as well as agricultural statistical data. The summaries shall be presented in the format shown by the attached examples. Only two general formats are to be used - one for the U.S. and one for all foreign countries. The Soviet Union summary is an example of the format to be used for all foreign countries. The text of these formats will be varied to meet the potential practices of a specific country.

These ancillary summaries are required at the county level for all counties in the United States containing one or more 5 x 6 n.mi. LACIE sample segments. For the foreign countries listed below, the data are required for political subdivision designated as acreage strata for aggregation purposes.

<u>Country</u>	<u>Acreage Strata</u>
Canada	Census Division
USSR	Oblast
P.R.C.	Province
India	District

SEGMENT NO. _____

SOVIET UNION
ANCILLARY SUMMARY

S.S.R. _____ OBLAST/KRAY _____

SEGMENT COORDINATES LAT. _____ LONG. _____

MAP NO. _____ SCALE _____

SOIL TYPE/COLOR _____ CLIMATE (KÖPPEN) _____

WMO NO. _____

I. CROPPING PRACTICES

Figure 6-1.- Soviet Union ancillary summary.

Segment No. _____

S.S.R. _____ Oblast/Kray _____

II.

Land Use	Area in 1000 Ha. Most Recent Year	Percent as Indicated
A. SSR		
B. Oblast/Kray		
1. Cropped Area		
a. Net area sown		
b. Area sown more than once		
c. Irrigated area		(% of 1A)
2. Fallow Area		
a. Fallow less than 1 year		
b. Fallow 1-5 years		
c. Fallow more than 5 years		
3. Non-cultivated Area (a+b+c)		
a. Forest		
b. Permanent pasture/grazing		
c. Other (marsh/desert/ urban, etc.)		

Comments:

Figure 6-2.- Land use.

Segment No. _____

S.S.R. _____ Oblast/Kray _____

III. Agricultural Information

A. Average Field Sizes

B. Wheat (% of reporting Unit) _____

C. Conservation Practices

1. Irrigated land (% of reporting unit)

2. Contour (Acres) Strip (Acres) Terrace (Acres)

IV.

Crops Include All	Most Recent Year 19			Remarks
	Area	Percentage	Percentage Irrigated	

Figure 6-3.- Agricultural information; Crops.

UNITED STATES ANCILLARY SUMMARY

County(ies) _____ State _____ Seg. No. _____
Seg. Coord. _____ CRJ _____

Soil Type/Color _____ Climate (Köppen) _____
CROPPING PRACTICES Seasonal Precipitation
 Annual Precipitation

Figure 6-4.- United States ancillary summary.

U



Country
Australia
Argentina
Brazil

Acreage Strata
Division
Partido
Municipality

6.1.2.4.1

Cropping practices: The agricultural statistical data required can be determined from the ancillary summary forms themselves. The cropping practices data requires an explanation of the particular information required.

Cropping practices are defined as any cultural activity that may create or alter the external morphological characteristics (appearance) of a field or crop signature response as detected by high altitude aircraft or spacecraft remote sensors. Examples of cropping practices for which information is desired are listed below:

- A. Cropping systems or crop rotation practices
- B. Irrigation practices
- C. Special practices
 - 1. Wheat grazing
 - 2. Cover cropping
 - 3. Green Manure crops

6.1.2.4.2

Crop rotation systems: Generalized information on crop rotation systems will be needed. Three examples of this type of data are as follows:

- A. Crop rotation systems in the Corn Belt
 - 1. 3-year rotation of corn, oats, red clover, and timothy sod
 - 2. 4-year rotation of corn, soybeans, oats and clover
 - 3. 5-year rotation of 2 years of corn, 1 year of oats, and 2 years of alfalfa-bromegrass
- B. 1-year cropping systems
 - 1. Winter wheat followed by annual lespedeza
 - 2. Winter rye grass alternated with a summer row crop such as corn
- C. Cropping practices in Yangtze Valley, China
 - 1. Cotton is hand-broadcast in the wheatfield 1 month prior to the wheat harvest

Storage of these data on a sample segment basis in the LPDL is required. Approximately 20 such sets of data per day will be accessed.

- 6.1.2.5. Crop Calendars. - (Required by CAMS; Category 1; Implementation Responsibility: DAPTS/USDA). DAPTS is required to provide a mean historical crop calendar for each sample segment to assist the Analyst Interpreters (A.I.'s) in image interpretation. Each calendar shall describe the progress of wheat and all other crops which, taken together, constitute at least 95 percent of the cultivated area for which information is available. The year or years of historical data used in the development of the calendar shall be stated. Data sources shall also be stated. For foreign countries the calendars shall be prepared for acreage strata, where possible. In the U.S. data will be required at the CRD level.

The calendars for each crop will be presented as the percent area in a specified growth stage at a specified date. An example of the desired data product output format is attached. Two copies are required.

6.1.3 Yield Estimation Subsystem

- 6.1.3.1 Historical agricultural data requirements. - (Required by YES; Category 1; Implementation Responsibility: DAPTS/USDA). DAPTS will

provide historical agricultural statistics to YES for use in the yield modeling activities. The data required are:

- A. Statistics on wheat yield and wheat acreage to the CAS aggregation strata level for the U.S. and LACIE foreign countries for all years of record.
- B. Statistics on the acreage of all nonwheat crops in the strata of A above for the most recent 3 to 5 years.

Statistics are required only for those aggregation strata containing sample segments.

STATE _____

SEGMENT No. _____

CRD & No. _____

DATE _____

CROP CALENDARS
PERCENT OF AREA IN DEVELOPMENT STAGE BY SPECIFIED DATE

CROP	% AREA	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	
WINTER WHEAT	100 75 50 25									75 50 25
BARLEY	75 50 25									75 50 25
OATS	75 50 25									75 50 25
RYE	75 50 25									75 50 25
ALFALFA	75 50 25									75 50 25
SORGHUM	75 50 25									75 50 25
CORN	75 50 25									75 50 25
SOYBEANS	75 50 25									75 50 25
	75 50 25									75 50 25
	75 50 25									75 50 25
	75 50 25									75 50 25

• YEARS OF DATA: _____ - _____ AVERAGE
(NO ADJUSTMENTS FOR WEATHER MADE)

• SOURCE OF DATA: _____

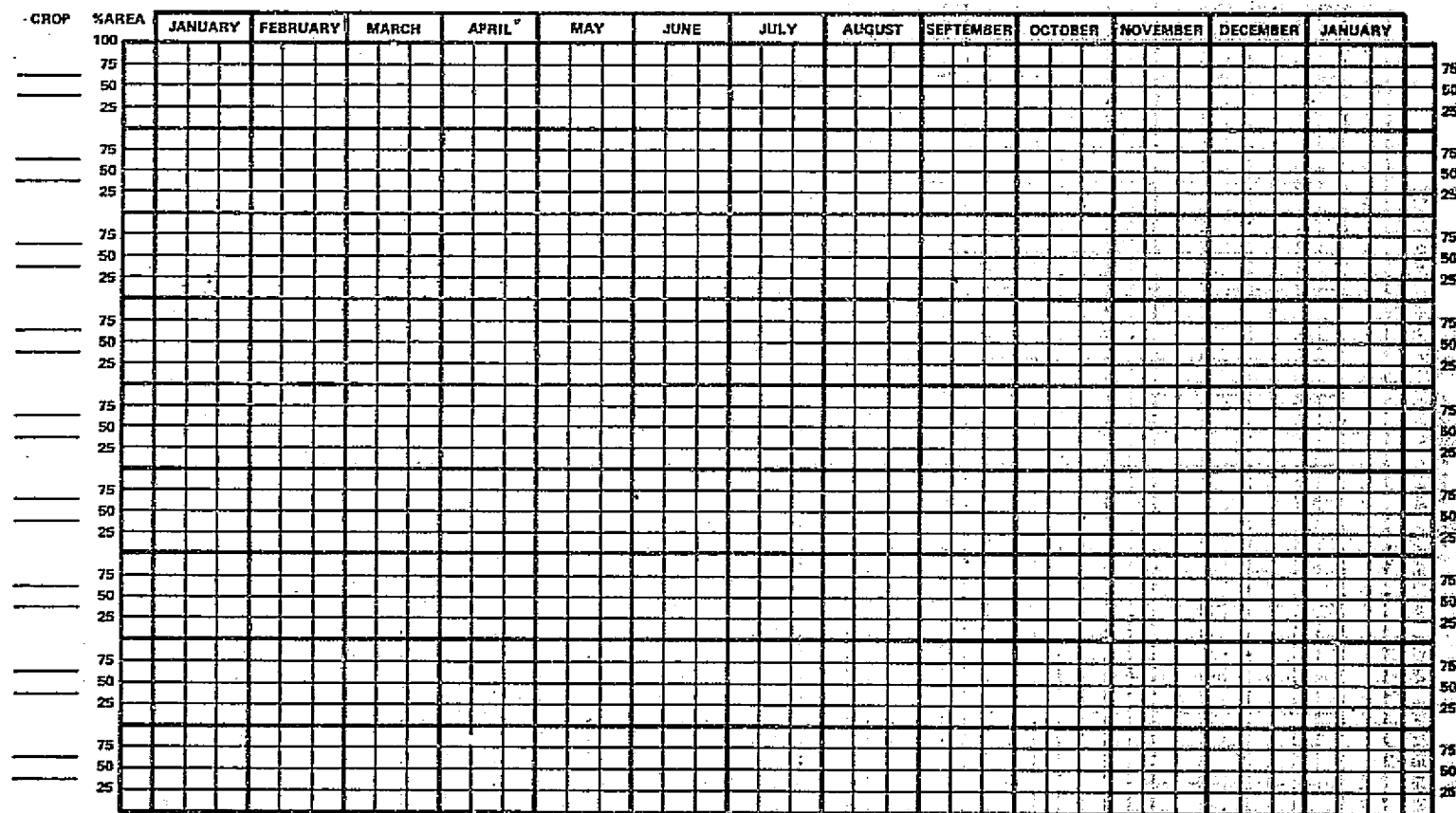
• ESTIMATED ACCURACY OF DATES AS THEY WOULD APPLY TO ANY GIVEN YEAR:
± _____ DAYS

Figure 6-6.- Crop Calendars.

COUNTRY: _____

DATE: _____

CROP CALENDARS



SOURCE: _____ ESTIMATED YEARLY SHIFT IN DATES: ± _____ DAYS
YEARS OF DATA: _____
ADJUSTED FOR WEATHER: YES NO

ADJUSTED FOR WEATHER: YES NO

Figure 6-6.-- Concluded

Statistics will be updated as new data is received, generally at least once yearly. Data must be available for recall within 24 hours. Three copies of statistical data in tabular form are required by July 1, 1975.

6.1.3.2

Crop calendar data.- (Required by: YES; Category 1; Implementation Responsibility: DAPTS/USDA). DAPTS is required to provide YES with historical crop calendars for the U.S. to use in development and testing of the Adjustable Crop Calendar Model.

Each calendar shall describe the progress of wheat and all other crops which, taken together, constitute at least 95 percent of the cultivated area for which information is available. Calendars are required on an individual year basis, for as many years as data is available from state and national sources. Crop calendars are required for all CRD's in the U.S. containing one or more sample segments.

The calendars for each crop will be presented as the percent area in a specified growth stage at a specified date. An example of the desired data product output format is attached. Three copies are required. These data are required as soon as possible (ASAP) per the rescoped Phase II effort.

6.1.3.3

Soil maps.- (Required by YES; Category 1; Implementation Responsibility: DAPTS/USDA). Ten copies of individual soil maps for the U.S. and each LACIE foreign country are required. The areas within each country for which soils information is required are those areas used for sample segment definition. Maps are to be provided as a positive print, at a scale of 1:5,000,000 or greater (as available), and at a known projection. The soil classification system preferred is the 7th approximation system; however, the genetic (Dokuchev) system is also acceptable. In both classification systems there must be a sufficient level of detail on the maps provided to allow

STATE
 CRD & No.

SEGMENT No.
 DATE

CROP CALENDARS
PERCENT OF AREA IN DEVELOPMENT STAGE BY SPECIFIED DATE

CROP	% AREA	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER
WINTER WHEAT	100 75 50 25								
BARLEY	75 50 25								
OATS	75 50 25								
RYE	75 50 25								
ALFALFA	75 50 25								
SORGHUM	75 50 25								
CORN	75 50 25								
SOYBEANS	75 50 25								
	75 50 25								
	75 50 25								
	75 50 25								

- YEARS OF DATA: AVERAGE
 (NO ADJUSTMENTS FOR WEATHER MADE)
- SOURCE OF DATA:
- ESTIMATED ACCURACY OF DATES AS THEY WOULD APPLY TO ANY GIVEN YEAR:
 ± DAYS

Figure 6-7.- Crop Calendars.

STATE, PROVINCE, OR OBLAST: _____

SEGMENT NO: _____

COUNTRY: _____

DATE: _____

CROP CALENDARS
PERCENT OF AREA IN DEVELOPMENT STAGE BY SPECIFIED DATE

CROP	%AREA	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	JANUARY
	100													
	75													
	50													
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determination off the boundaries of soil suborders. Maps must be reviewed yearly and updated as new material becomes available.

6.1.3.4

Topographic maps.- (Required by YES; Category 1; Implementation Responsibility: DAPTS/F50). Ten copies of topographic maps for all areas containing sample segments are required for all LACIE countries. In the U.S. these maps are required in scales of 1:1,000,000 for areas containing one or more sample segments. The contour interval shall be the standard for the scale map under consideration with the criterion being to show the greatest amount of detail while maintaining clarity.

For the LACIE foreign countries the maps required will be at or as near as possible to the scale and detail of the U.S. maps. In cases where topographic maps are not available, relief maps showing feature changes using hachures, tints or shading will be provided. These maps (both U.S. and foreign) will be updated as better information becomes available.

6.1.3.5

Cropping practices.- (Required by YES; Category 1; Implementation Responsibility: DAPTS/USDA). DAPTS shall output to the LPDL for the YES 10 copies of a cropping practices report for each acreage strata. The format of the cropping practices report is to be per the attached example. The cropping practices reports are required in the U.S. at the Crop Reporting District (CRD) level for all CRD's containing one or more LACIE sample segments. For foreign countries, the cropping practices are required for political subdivisions designated as acreage strata for aggregation purposes. These countries and strata level of detail are listed below:

<u>Country</u>	<u>Acreage Strata</u>
Canada	Census Division
USSR	Oblast
P.R.C.	Province
India	District
Australia	Division

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Argentina
Brazil

Partido
Municipality

- 6.1.3.5.1 Descriptions of cropping practices employed: These are required for each sample segment. The cropping information required is defined as any cultural activity that may create or alter the external morphological characteristics (appearance) of a field or crop signature response as detected by high altitude aircraft or spacecraft remote sensors. Examples of cropping practices for which information is desired are listed below:
- A. Cropping systems or crop rotation practices
 - B. Irrigation practices
 - C. Special practices
 - 1. Wheat grazing
 - 2. Cover cropping
 - 3. Green Manure crops
- 6.1.3.5.2 Crop rotation systems: Generalized information on the crop rotation systems will be needed. Three examples of this type of data are as follows:
- A. Crop rotation systems in the Corn Belt
 - 1. 3-year rotation of corn, oats, red clover and timothy sod
 - 2. 4-year rotation of corn, soybeans, oats and clover
 - 3. 5-year rotation of 2 years of corn, 1 year of oats, and 2 years of alfalfa-bromegrass
 - B. 1-year cropping systems
 - 1. Winter wheat followed by annual lespedeza
 - 2. Winter rye grass alternated with a summer row crop such as corn
 - C. Cropping practice in Yangtze Valley, China
 - 1. Cotton is hand-broadcast in the wheatfield 1 month prior to the wheat harvest
- 6.1.3.6 Overlap regions.- (Required by YES; Category 1; Implementation Responsibility: DAPTS/USDA). Map overlays for 1:5,000,000 scale LACIE site location maps showing the winter/spring wheat overlap regions for the U.S., U.S.S.R. and

P.R.C. are required. These overlays will be reviewed annually and updated as required. The criteria for an update is whenever overlap boundaries change. These overlays are required for the U.S. ASAP. The overlays for the U.S.S.R. and the P.R.C. will be required by January 31, 1976. One copy of each overlay is required.

6.1.3.7

Boundaries of political subdivisions.-

(Required by YES; Category 1; Implementation Responsibility: DAPTS/USDA). Seven copies of maps of 1:5,000,000 scale or larger of each LACIE country, delineating the boundaries of the smallest political subdivisions, are required. These maps will be acceptable as long as the projection is a standard projection (i.e., Mercator, etc.) and is stated on the map itself.

The smallest political subdivisions of interest are as follows:

<u>Country</u>	<u>Level of Detail (Stratum)</u>
U.S.S.R.	Oblast
U.S.	CRD
Canada	Census Division
P.R.C.	Province
Australia	Division
Argentina	Partido
Brazil	Municipality
India	District

The need dates for these maps are TBD. These maps will be updated annually or whenever more detailed data becomes available or boundary changes occur.

6.1.3.8

Agricultural reports.- (Required by YES; Category 1; Implementation Responsibility: DAPTS/USDA/FSO). USDA reports containing information from the previous crop year on wheat yields in all LACIE countries are required by YES. Episodic events which may produce a change in the expected yield in a specific geographical area are of primary interest. Reports from foreign sources are acceptable, provided they have been reviewed by

a competent authority for accuracy of the data presented.

6.1.3.9

Spring and winter wheat growth stage dates.-

(Required by YES; Category 1; Implementation Responsibility: DAPTS/USDA). To ensure an adequate agricultural data base for tests of the adjustable crop calendar and the adjustable crop calendar starter model, the following data on dates when the crop reaches a certain stage of development will be provided. These dates are required for spring and winter wheat (separately) where they co-exist in the following locations: (1) all Intensive Test Sites (ITS); (2) Texas, CRD's IN, IS, 2 N&S, 5 N&S, 8 N&S; (3) Kansas, all CRD's; (4) North Dakota, all CRD's; (5) Montana, CRD 1, 2, & 3; (6) foreign areas where available.

The dates are required when the growth stages (as described in Appendixes A, B, and C) are as follows: (1) 50 percent of fields are planted; (2) 50 percent of fields are emerged; (3) 50 percent of the fields have started to joint; (4) 50 percent of the fields have started to head; (5) 50 percent of the fields have reached soft dough (start to turn color); (6) 50 percent of the fields are ripe (hard dough); (7) 50 percent of the fields are harvested. In addition to the above, 10 percent and 90 percent dates for (1) through (7) are required for all ITS.

To operate the adjustable crop calendar (as a backup starter) the following information is required: (1) For winter wheat in each CRD in LACIE where a winter wheat sample segment exists (see Appendix D for states in which winter wheat sample segments exist) and in LACIE foreign areas where available, the date 50 percent of the crop has been planted and the date 50 percent of the crop has begun to joint. (2) For spring wheat in each CRD in LACIE where a spring wheat sample segment exists (see Appendix D for states in which spring wheat sample segments exist) and in LACIE foreign areas where available the date 50 percent of the crop has been planted.

Appendix E contains the suggested data formats for 50 percent, 10 percent and 90 percent growth stage dates reports.

This information is required from the crop year starting October 1974 to 1975 and each year for the duration of the LACIE Program.

6.1.4 Crop Assessment Subsystem

6.1.4.1 Historical agricultural statistics.- (Required by CAS; Category 1; Implementation Responsibility: DAPTS/USDA). CAS requires historical wheat acreages (planted and harvested), production, yield data, total agricultural area and total area for the smallest reporting political subdivision for each LACIE country for the past 15 years if available. These data are required on punched cards or computer compatible magnetic tape, one tape per country per year, updated on an annual basis. The need date for the U.S. is ASAP. For all other LACIE countries data is required by November 1, 1975. Specific data requirements and formats are as shown in Appendix F.

6.1.4.2 Overlap regions.- (Required by CAS; Category 1; Implementation Responsibility: DAPTS/USDA). Map overlays for 1:5,000,000 scale LACIE site location maps showing the winter/spring wheat overlap regions for the U.S., U.S.S.R., and the P.R.C. are required by CAS. These overlays will be reviewed annually and updated as required. The criteria for an update is whenever overlap boundaries change. These overlays are required for the U.S. ASAP. The overlays for the U.S.S.R. and the P.R.C. will be required by January 31, 1976. One copy of each overlay is required.

6.1.4.3 Boundaries of political subdivisions.- (Required by CAS; Category 1; Implementation Responsibility: DAPTS/USDA). Four copies of maps of 1:5,000,000 scale or larger of each LACIE country, delineating the boundaries of the smallest political subdivisions, are required. These maps will be acceptable as

long as the projection is a standard projection (i.e., Mercator, etc.) and is stated on the maps provided. The maps shall cover each country in detail at least as fine as the data presented in paragraph 6.1.4.1.

The smallest political subdivisions of interest in CAS acreage aggregation are as follows:

<u>Country</u>	<u>Level of Detail (Stratum)</u>
U.S.S.R.	Oblast
U.S.	CRD
Canada	Census divisions or subdivisions
P.R.C.	Province
Australia	Division
Argentina	Partido
Brazil	Municipality
India	District

The need dates for these maps are the same as the need dates for the data specified in paragraph 6.1.4.1.

These maps will be updated annually or whenever more detailed data becomes available or boundary changes occur.

6.1.4.4

Cropping practices - CAS. - (Required by CAS; Category 1; Implementation Responsibility: DAPTS/USDA). Cropping practices reports (ancillary summaries) are required for each stratum identified in paragraph 6.1.4.3. Acceptable reports are presently being produced for YES on an acreage strata basis (ref. paragraph 6.1.3.5) and are available in the LPDL for CAS use.

These reports contain such data as cropping systems or crop rotation practices, irrigation practices, special practices and crop rotation systems.

6.1.4.5

Crop calendars. - (Required by CAS; Category 1, Implementation Responsibility: DAPTS/USDA). CAS requires mean historical crop calendars for each of the acreage strata identified in paragraph 6.1.4.3. These crop calendars will

be used in determining the acquisition windows for Landsat data.

Each calendar shall describe the progress of wheat and all other crops which, taken together, constitute at least 95 percent of the cultivated area for which information is available. Calendars shall be constructed using the 15 most recent years' data, if available. The year or years of historical data used in the development of the calendar shall be stated. Data sources shall also be stated.

The calendars for each crop will be presented as percent area in a specified growth stage at a specified date. An example of the desired data product output format for the U.S. and foreign countries is attached. One copy of these calendars is required per stratum. The update of the calendars will be annually and the base will increase to 16 years, 17 years, etc.

6.1.4.6

Agricultural reports.- (Required by CAS; Category 1; Implementation Responsibility: DAPTS/USDA). USDA reports containing information for the previous crop year on wheat acreage, yield and production in all LACIE countries are required by CAS. Reports published by LACIE foreign countries are also acceptable, providing they have been reviewed by a competent authority for accuracy of the data presented. The attached list presents the historical CAS report requirements. One copy of each report is required in the LPDL for the use of CAS.

The following CAS-required publications are the minimum report requests from the USDA:

- A. Foreign Agriculture Circular - Grains (FAS) - Quarterly
- B. Foreign Agriculture (FAS) - Weekly
- C. Wheat Situation (ERS/SRS) - Quarterly
- D. Foreign Agricultural Attache Reports
- E. World Agriculture and Trade (FAS) - Quarterly
- F. U.S. Weekly Weather and Crop Report

STATE _____
CRD & No. _____

SEGMENT No. _____
DATE _____

CROP CALENDARS
PERCENT OF AREA IN DEVELOPMENT STAGE BY SPECIFIED DATE

CROP	% AREA	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	
WINTER WHEAT	100 75 50 25									75 50 25
BARLEY	75 50 25									75 50 25
OATS	75 50 25									75 50 25
RYE	75 50 25									75 50 25
ALFALFA	75 50 25									75 50 25
SORGHUM	75 50 25									75 50 25
CORN	75 50 25									75 50 25
SOYBEANS	75 50 25									75 50 25
	75 50 25									75 50 25
	75 50 25									75 50 25
	75 50 25									75 50 25

- YEARS OF DATA: _____ - _____ AVERAGE
(NO ADJUSTMENTS FOR WEATHER MADE)
- SOURCE OF DATA: _____
- ESTIMATED ACCURACY OF DATES AS THEY WOULD APPLY TO ANY GIVEN YEAR:
± _____ DAYS

Figure 6-8.- Crop Calendars.

- G. Weekly Weather and Crop Reports for all states in the U.S. listed under (H) below
- H. Interim estimates and final post-harvest values of wheat acreage, yield and production as published by the states in the U.S. listed below:

Arkansas	Montana
Arizona	North Dakota
California	Nebraska
Colorado	Oklahoma
Idaho	Pennsylvania
Indiana	South Dakota
Kansas	Tennessee
Maryland	Texas
Minnesota	Utah
Missouri	Washington

6.1.5

ISRRS

Not applicable.

6.1.6

SPE-EA

6.1.6.1

DAPTS historical agricultural data resources parameters. - (Required by SPE-EA; Category 1; Implementation Responsibility: DAPTS/USDA). DAPTS will monitor and record, on an as-requested basis.

6.1.7

IE

Not applicable.

6.1.8

Research

The data requirements for research in support of LACIE have not been established as of the publication date of this document revision. It should be noted that the expected number of requirements will impact DAPTS measurably.

6.1.9

Test and Evaluation

The data requirements for test and evaluation (TSE) have not been established as of this date. Again, as in the case of research, these additional requirements will impact DAPTS.

SECTION 7.0
INTERFACE REQUIREMENTS DOCUMENT

Each implementing organization shall comply with the interface requirements specified in the USDA/NASA-JSC Interface Control Document, dated November 1975.

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SECTION 8.0
OPERATIONAL REQUIREMENTS AFFECTING DAPTS DESIGN

- 8.1 **THROUGHPUT REQUIREMENTS**
The portion of the DAPTS that deals with historical agricultural data must be sized to handle a TBD volume of data, mediums TBD.
- 8.2 **RESPONSE REQUIREMENTS**
The response requirements for the DAPTS are defined by the required output formats, data products and delivery schedules of the LACIE subsystems using DAPTS products. Need dates for data products used in the operational area of each LACIE subsystem are defined in the Level 4 DAPTS working schedules.
- 8.3 **RELIABILITY REQUIREMENTS**
Not applicable.
- 8.4 **SECURITY REQUIREMENTS**
A LACIE Security Plan shall be prepared by each organization designated with implementation responsibility. The plan for each implementing organization shall define the specific measures that will be utilized by that organization to comply with LACIE security requirements. The LACIE security requirements shall be defined by the USDA and will be forwarded to the implementing organizations upon receipt by the LACIE Project Manager. Each implementing organization shall submit its plan for approval to the LACIE Level 3 Change Board within 90 days after receipt of the USDA requirements.
- 8.5 **DELIVERY REQUIREMENTS**
Not applicable.
- 8.6 **QUALITY ASSURANCE REQUIREMENTS**
A LACIE Quality Assurance (QA) Plan is being prepared under the direction of the Quality Assurance Manager. Concurrent with this Quality Assurance Plan, a Quality Assurance Procedures Document is being prepared. The procedures contained in the QA Procedures Document have been prepared by the respective organizational elements and will be implemented by personnel within these organizations.

8.7

OTHER OPERATIONAL REQUIREMENTS
Not applicable.

SECTION 9.0
SUBSYSTEM VERIFICATION REQUIREMENTS

Each organization designated with implementation responsibility shall prepare a LACIE Verification Plan, including a complete definition of the verification functions proposed for verification of the portion of LACIE for which it is responsible. Each organization shall submit its plan for approval to the LACIE Level 3 Change Board within 90 days after the requirements documents are baselined.

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SECTION 10.0
RESEARCH REQUIREMENTS

None.

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SECTION 11.0
TEST AND EVALUATION REQUIREMENTS

None.

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SECTION 12.0
RESOURCE REQUIREMENTS

None.

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APPENDIX A
DEFINITION OF WHEAT GROWTH STAGES

- Emerged* - Is defined as indicated by Stage 1 of figure B-1 where there is only one shoot. This is prior to tillering and prior to Code 1, Pre-Flag, of Appendix C (extract from Enumerator's Manual, 1974 Wheat Objective Yield survey).
- Jointed* - Is defined as indicated by Stage 6 of figure B-1 where first node of the stem is visible. This stage is also prior to Code 1, Pre-Flag, of Appendix C (extract from Enumerator's Manual, 1974 Wheat Objective Yield Survey).
- Heading* - Is defined as indicated by Stage 10.1 of figure B-1 and is equivalent to Code 3, Late Boot or Flower (Heads Emerged) includes Watery Kernels, of Appendix C (extract from Enumerator's Manual, 1974 Wheat Objective Yield Survey).
- Soft Dough* - Is defined as indicated by Stage 11+ of figure B-1 and is equivalent to Code 5 of Appendix C (extract from Enumerator's Manual, 1974 Wheat Objective Yield Survey).
- Hard Dough* - Is defined as Code 6 of Appendix C (extract from Enumerator's Manual, 1974 Wheat Objective Yield Survey).
- Harvest or Harvestable* - Is defined as Code 7 of Appendix C (extract from Enumerator's Manual, 1974 Wheat Objective Yield Survey).

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*Note: There will be cases when the observer will be undecided on the growth stage (i.e., maturity stage) of the field. When this occurs, review the growth stages (maturity stages) involved and classify the unit in the stage that it most nearly represents. If still undecided, classify it in the lower stage of growth (maturity).

APPENDIX B
ILLUSTRATION OF THE FEEKES SCALE

Figure B-1 is an illustration of the Feekes Scale.

~~ALL INFORMATION CONTAINED HEREIN IS UNCLASSIFIED~~

B-2

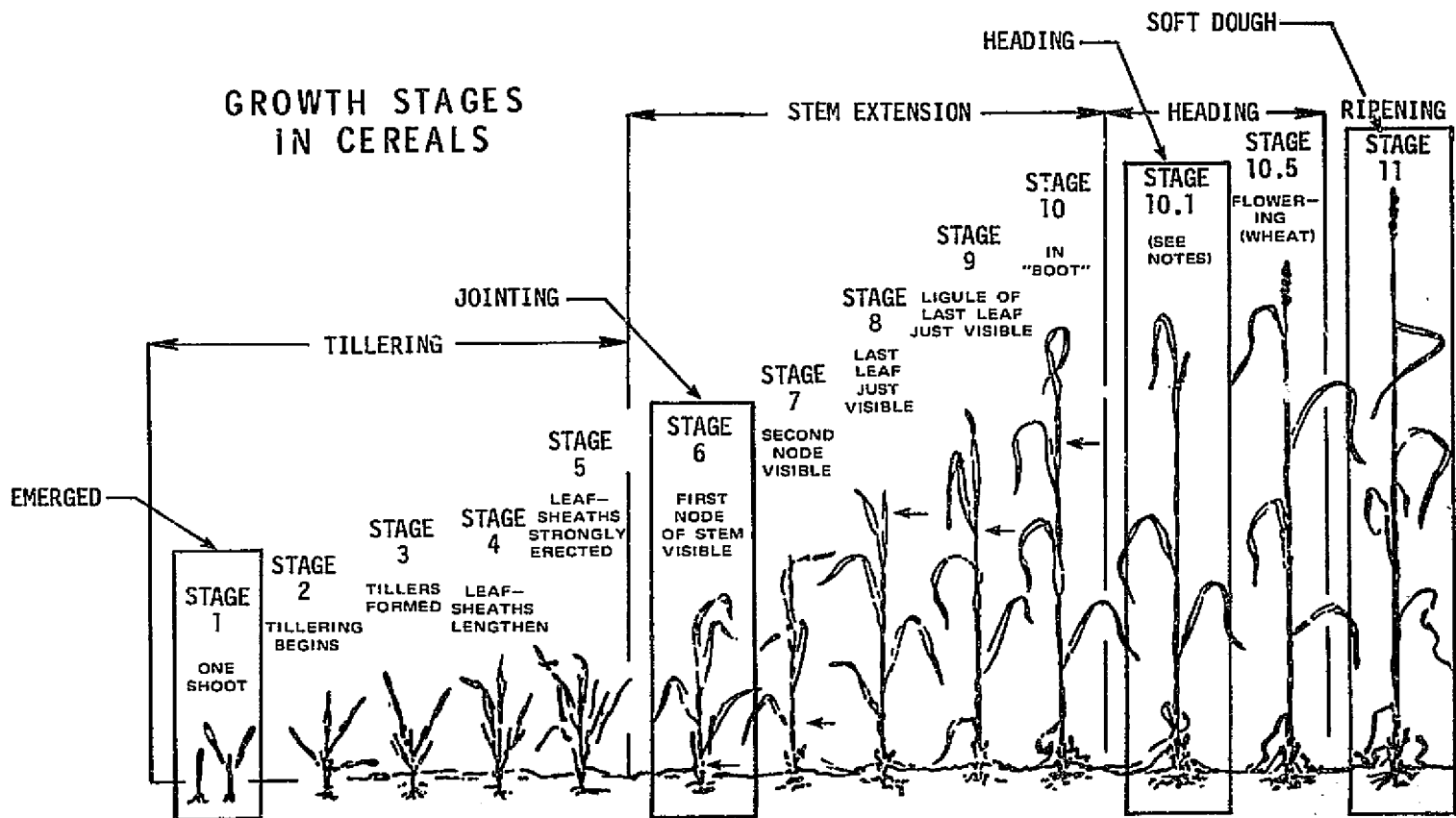


Figure B-1.- Illustration of the Feekes Scale.

From E. C. Large, Growth Stages in Cereals. Plant Path. 3:128-129. 1954.

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APPENDIX C
EXTRACT FROM ENUMERATOR'S MANUAL
1974 WHEAT OBJECTIVE YIELD SURVEY

Item 2 - Stage of Maturity

A stage of maturity is to be assigned each unit by circling the numerical stage code in the Item 2 table. The stage which you assign the unit should be the same as that of the greatest number of stalks inside the unit. Do not damage any plants in the unit. Where some plants in the field have started to head, examine a few heads outside the unit to assist you in determining the maturity. Use the descriptive material below and on the back cover as criteria for arriving at the stages of maturity. There will be cases when you are undecided on the maturity stage of the unit. When this occurs, review the maturity stages involved and classify the unit in the stages that it most nearly represents. If still undecided, classify it, in the lower stage of maturity.

C.

Maturity Stages:

Code 1 - Pre-Flag

This is a general category in which you will record all units where tillers are only an inch or two high, up to units where stalks are large or mature enough to be in the "Boot" stage. The stalks do not indicate any swelling and do not have the definite flag leaf or other evidence of a partly developed head inside the leaf sheath.

Code 2 - Flag or Early Boot

Stalks are starting to joint and joints can be seen easily. The plant has four or five leaves and the "flag leaf" is identifiable and

its collar is visible above the top foliage leaf. A partly developed head may be detected by noting that the stem has started swelling below the top foliage leaf. This swelling may also be felt inside the sheath. Be careful not to damage the partly developed head by squeezing the stem of sheath.

In most cases the presence of heads enclosed in the leaf sheath could be verified by going outside the unit. Examine stalks that are similar in appearance to the doubtful ones before classifying the unit in the FLAG or EARLY BOOT stage. Clip a few stalks, unroll the leaf sheath and see whether or not there is a small, partially developed head encased in the sheath.

Code 3 - Late Boot or Flower (Heads Emerged)
Includes Watery Kernels

The head has moved up in the stem so that some swelling has occurred above the base of the top foliage leaf. The sheath will split shortly after the "Late Boot" stage and the head will partially or wholly emerge. The flower stage occurs soon after the head emerges. Small blooms or flowers begin to open at the base of the head and blooming progresses toward the tip. For our purpose, consider the unit to be in the late boot or flower stage from the time swelling can be seen or felt above the top foliage leaf until the watery clear liquid in the kernel has begun to turn milky.

Code 4 - Milk

Kernels are formed in heads. Kernels of grain are soft, moist and milky. When the grain is

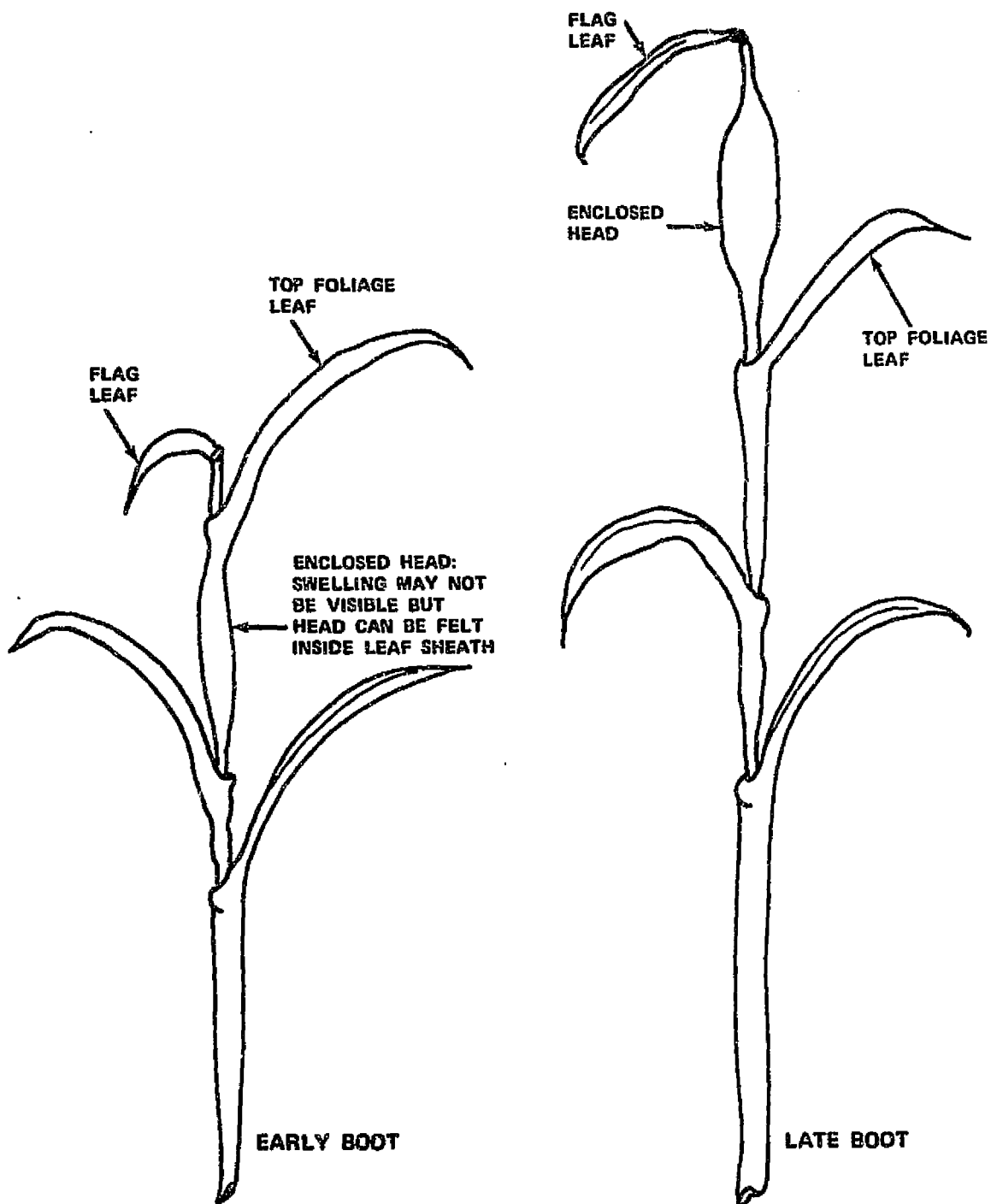


Figure C-1.- Classifying heads in "early boot" and "late boot" stages of maturity.

squeezed, a milky liquid can be observed. The plant is still generally green. One of two of the lower leaves may be dead, but the three upper leaves and the head are green. Signs of ripening (yellow spots or stripes) are visible only on the edges or tips of the leaves.

Code 5 - Soft Dough

The grains can be crushed between the thumb and fingernail; the contents of most of the grains are soft and can be kneaded like dough with only a few grains per head containing any milky liquid. The plant has changed to a golden tint (except in the purple-strawed types which are a pinkish purple color); the stalk is smooth and shiny, tough and pliable. Only the uppermost leaves are swollen and green, the lower leaves being shrunken and brownish.

Code 6 - Hard Dough

The grains readily part from the head and are likely to shake out of the glumes. The grain is firm and though it may be dented by pressure of the thumbnail, it is not easily crushed. The characteristic color of the grain has become more distinct. The yellow grains are paler, the red grains somewhat darker and flinty or mealy in character. The leaves are brown, dry and shrunken. Wheat in this category may be swathed in some areas.

Code 7 - Ripe

Straw is dull and brittle at this stage; the grain is hard and breaks in fragments when crushed. Harvest may be expected at this time.

Counts of Stalks and Heads within Count Area:

APPENDIX D
STATES IN WHICH WINTER AND SPRING WHEAT
SAMPLE SEGMENTS EXIST

STATES IN WHICH WINTER WHEAT SAMPLE SEGMENTS
EXIST

Arizona	Montana
Arkansas	Nebraska
California	Oklahoma
Colorado	Pennsylvania
Idaho	South Dakota
Indiana	Tennessee
Kansas	Texas
Maryland	Utah
Missouri	Washington

STATES IN WHICH SPRING WHEAT SAMPLE SEGMENTS
EXIST

Minnesota
Montana
North Dakota
South Dakota

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APPENDIX E
SUGGESTED DATA FORMATS

The suggested data formats are as shown on the following three pages.

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TABLE E-I

GROWTH STAGE DATES FOR 50% DEVELOPMENT

MONTH AND DAY OF MONTH

Check one:

☐ Spring Wheat☐ Winter Wheat

Crop Year _____

ITS SEG. NO. -OR- STATE	CRD #	PLANTING DATE ¹	EMERGENCE DATE ¹	JOINTING DATE ²	HEADING DATE ²	SOFT DOUGH DATE ³	RIPE DATE ⁴	HARVEST DATE ⁵

¹ Date at which 50% of fields in CRD were planted or emerged, respectively.² Date at which 50% of fields in CRD had begun to joint or head, respectively.³ Date at which 50% of fields in CRD had begun to enter soft dough stage (turning color to greenish-yellow to yellow).⁴ Date at which 50% of fields in CRD are ripe (hard dough) stage or when they were swathed. (Indicated swathed if applicable).⁵ Date at which 50% of fields in CRD have been harvested either as standing grain or out of swath.

TABLE E-II

GROWTH STAGE DATES FOR 10% DEVELOPMENT

MONTH AND DAY OF MONTH

Check one:

☐ Spring Wheat☐ Winter Wheat

Crop Year _____

ITS SEG. NO.	CRD #	PLANTING DATE ¹	EMERGENCE DATE ¹	JOINTING DATE ²	HEADING DATE ²	SOFT DOUGH DATE ³	RIPE DATE ⁴	HARVEST DATE ⁵

¹ Date at which 10% of fields in CRD were planted or emerged, respectively.² Date at which 10% of fields in CRD had begun to joint or head, respectively.³ Date at which 10% of fields in CRD had begun to enter soft dough stage (turning color to greenish-yellow to yellow).⁴ Date at which 10% of fields in CRD are ripe (hard dough) stage or when they were swathed. (Indicated swathed if applicable).⁵ Date at which 10% of fields in CRD have been harvested either as standing grain or out of swath.

TABLE E-III

GROWTH STAGE DATES FOR 90% DEVELOPMENT

MONTH AND DAY OF MONTH

Check one:

☐ Spring Wheat☐ Winter Wheat

Crop Year _____

TIS SEG. NO. -OR- STATE	CRD #	PLANTING DATE ¹	EMERGENCE DATE ¹	JOINTING DATE ²	HEADING DATE ²	SOFT DOUGH DATE ³	RIPE DATE ⁴	HARVEST DATE ⁵

¹ Date at which 90% of fields in CRD were planted or emerged, respectively.² Date at which 90% of fields in CRD had begun to joint or head, respectively.³ Date at which 90% of fields in CRD had begun to enter soft dough stage (turning color to greenish-yellow to yellow).⁴ Date at which 90% of fields in CRD are ripe (hard dough) stage or when they were swathed. (Indicated swathed if applicable).⁵ Date at which 90% of fields in CRD have been harvested either as standing grain or out of swath.

APPENDIX F
HISTORICAL AGRICULTURAL DATA AND
STATISTICAL DATA FORMATS

F1.0

INTRODUCTION

This Appendix to the LACIE USDA/NASA Interface Control Document (ICD) (Volume III) will define the data presentation formats for historical agricultural statistics data. These formats will be for both magnetic tape and punched cards. These statistical data are required to support Volume IC of the LACIE Requirements Document (LACIE-C00200).

F2.0

MAGNETIC TAPE FORMAT

The magnetic tape format required to support the historical agricultural statistical data requirement of Volume III of the USDA/NASA ICD will be defined in this section.

F2.1

BACKGROUND

Various LACIE functional elements have requirements for historical agricultural statistical data in the form of computer compatible tapes (CCTs). These historical data will consist of production, yield and acreage statistics to the finest granularity available, consistent with the heirarchy presented in table F-1.

The tapes will be provided as required, with a LACIE systems goal of one tape per year per country.

F2.2

LOGICAL DEVELOPMENT

The intent of the design of this tape format is to provide a baseline format from which various software development efforts can be undertaken. This design will provide the standardization required to allow for software design starts at various locations, while preserving the flexibility of a 4096-word record length. The format also provides for the standardization of all historical agricultural statistical data tapes, both for the U.S. and foreign countries.

The tape format provides for self-checking features, such as, to note the number of data

default values included and to note the number of complete data sets per logical record to the substratum level.

F2.3

TAPE CONTENTS

The tape will be a single file tape that will contain N logical records.

Various codes have been established per references F-1 and F-2 to allow for the efficient use of available word slots. These codes and abbreviations are listed in table F-III. Additional codes to cover the other aspects of the heirarchy (aggregation) will be provided via RECP as they are defined and approved by the LACIE Level 3 CCB.

The format, characteristics, blocking or layout of the data records (parameters, units and information) are listed in table F-II.

When writing the tape, in those cases where data does not exist, default values of 9999 will be substituted and so noted in the trailer record summary. In cases where fields have been abandoned, data will exist for acreage planted only.

This will constitute a complete data set, but must be noted to provide for proper summations and population (n) figures which will reflect the true statistical base.

F3.0

PUNCHED CARD FORMAT

Upon special request, the historical agricultural statistical data will be presented as punched cards. These data will be the same as the data described in section 2.0. These data cards will not be required as a normal course, but the capability to produce them is required.

F3.1

LOGICAL DEVELOPMENT

The format of these data cards has been designed to be consistent with the repeating portions of the data records on the magnetic tape. The codes employed will be the same as defined in table F-III. The word slot (field) designations will allow for the same granularity as the tape.

F3.2

CARD CONTENTS

The field designations and card layout is found in table F-II. The tape header record and trailer record will be deleted. The information location in the header and trailer records of the tape will be presented on the data transmittal forms accompanying the deck. Standard 80-column cards employing Hollerith code will be used.

F4.0 REFERENCES

- F-1. U.S. Department of Agriculture, Large Area Crop Inventory Experiment (LACIE) User Requirements, May 1975.
- F-2. U.S. Department of Commerce, National Bureau of Standards, Federal Information Processing Standards Publication (FIPS Pub 10-1), Countries, Dependencies, and Areas of Special Sovereignty, Federal General Data Standard Representations and Codes, 15 June 1974.
- F-3. FIPS Pub 10-1, Section G-2, SRS Geographic Codes, Revised December 1974.

TABLE F-I.- AGGREGATION HEIRARCHY

Listed below are the various levels and names of the aggregation heirarchy. The number listed below the partition name is the relative number of subdivisions.

<u>Country</u>	<u>Region</u>	<u>Zone</u>	<u>Stratum</u>	<u>Substratum</u>	<u>No. of segments</u>
U.S.	Region 5	State 48	CRD 304	County 3062	637
Canada	TBD 3	Province 3	Division 53	Subdivision 550	283
China	TBD 10	TBD 24	Province 24	N.A.	810
U.S.S.R.	TBD 10	Region 34	Oblast 112	N.A.	1948
Australia	TBD 3	State 5	Division 43	Shire or county 273	257
Argentina	TBD 5	State 5	Partido 154	N.A.	165
Brazil	TBD 5	Province 5	Munici- pality 28	N.A.	50
India	TBD 5	State 15	District 296	N.A.	626

TABLE F-II.- HISTORICAL DATA TAPE RECORD DESCRIPTOR

I. Specifications:

Tape	-	9 track
Density	-	800 BPI
Parity	-	ODD
Code	-	EBCDIC
LRECL	-	80 (unblocked)
Label	-	SL

II. Format:

<u>Item</u>	<u>Field Name</u>	<u>Disp</u>	<u>Size</u>	<u>Type</u>
1	Country Code	1	2	A**
2	Region Code	3	4	N
3	Zone Code	7	4	N
4	Stratum Code	11	4	N
5	Substratum Code	15	4	N
6	Crop Year	19	2	N
7	Commodity Code	21	4	A**
8	Acreage Planted	25	10	N
9	Acreage Harvested	35	10	N
10	Yield/Planted Acre	45	10	N*
11	Yield/Harvested Acre	55	10	N*
12	Production	65	10	N
13	Filler	75	6	N

* Yield computed. Floating point format.

** Values left justified.

**TABLE F-III.- CODES FOR HISTORIC AGRICULTURAL STATISTICAL
DATA TAPES**

The codes to be employed in the generation of the
historical agricultural data tapes are as follows:

Commodity Codes (Reference 1)

<u>Commodity</u>	<u>Code</u>
Wheat, All	W
Wheat, Winter	WW
Wheat, Spring	WS
Wheat, Winter, Hard Red	WWHR
Wheat, Winter, Soft Red	WWSR
Wheat, Winter, White	WWW
Wheat, Durum	WD
Wheat, Durum, Red	WDR
Wheat, Spring, Hard Red	WSHR
Wheat, Spring, White	WSW

Country Codes (Reference 2)

<u>Country</u>	<u>FIPS Code</u>
U.S.	US
U.S.S.R.	UR
China	CH
India	IN
Australia	AS
Argentina	AR
Brazil	BR
Canada	CA

TABLE F-III.- Continued

State Codes (Reference 3)

<u>FIPS STATE</u> <u>CODE</u>	<u>STATE</u>	<u>FIPS STATE</u> <u>CODE</u>	<u>STATE</u>
01	Alabama	53	Washington
02	Alaska	54	West Virginia
04	Arizona	55	Wisconsin
05	Arkansas	56	Wyoming
06	California		
		<u>OUTLYING AREAS</u>	
08	Colorado		
10	Delaware		
12	Florida	72	Puerto Rico
13	Georgia	78	Virgin Islands
15	Hawaii	<u>CODE EXTENSIONS FOR SRS USE</u>	
16	Idaho	61	SRS region "A"
17	Illinois	62	SRS region "B"
18	Indiana	63	SRS region "C"
19	Iowa	64	SRS region "D"
20	Kansas	65	SRS region "E"
21	Kentucky	66	SRS region "F"
22	Louisiana	67	SRS region "G"
24	Maryland	68	SRS region "H"
26	Michigan	69	SRS region "I"

TABLE F-III.- Concluded

<u>FIPS state code</u>	<u>State</u>	<u>Code extension for SRS use</u>	
27	Minnesota	70	SRS region "J"
28	Mississippi	81	Standard Federal Region I
29	Missouri	82	Standard Federal Region II
30	Montana	83	Standard Federal Region III
31	Nebraska	84	Standard Federal Region IV
32	Nevada	85	Standard Federal Region V
34	New Jersey	86	Standard Federal Region VI
35	New Mexico	87	Standard Federal Region VII
36	New York	88	Standard Federal Region VIII
37	North Carolina	89	Standard Federal Region IX
38	North Dakota	90	Standard Federal Region X
39	Ohio	<u>SUMMARY CODES</u>	
40	Oklahoma	97	Total - "other" states
41	Oregon	98	Grand Total (less than U.S. when U.S. not published)
42	Pennsylvania		
45	South Carolina	99	Total - U.S.
46	South Dakota		
47	Tennessee		
48	Texas		
49	Utah		
51	Virginia		

NASA-JSC